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(54) Modular shelving with cabinet

(57) Modular shelving with at least one cabinet that includes a plurality of shelves and vertical risers which serve to space the shelves and support loads placed thereon. Cabinet side wall, back wall and door panels are installed about the risers, with each component having a pair of spaced apart holes adapted to slide over the risers. The holes preferably have a diameter just slightly less than the smallest diameter portion of the risers over which the panels will be placed, and are surrounded by one or more radial slots which allow the material around the hole to flex and accommodate larger diameter portions of the risers with an interference fit. The interference fit eliminates the need for precise hole size manufacturing and provides an additional advantage of holding the cabinet doors in a position selected by the consumer.

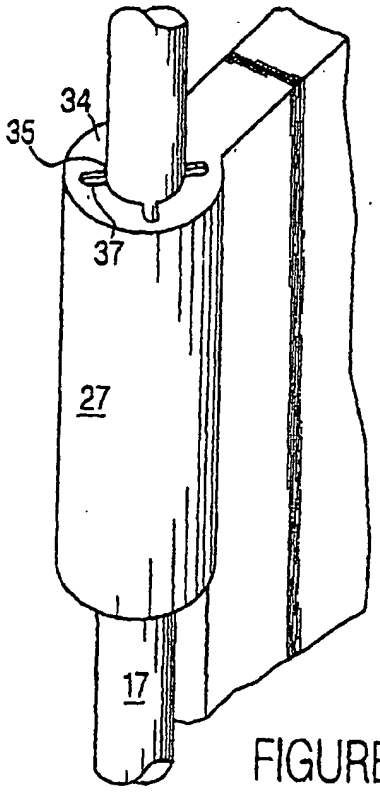

FIGURE 3

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present invention claims priority under 35 U.S.C. § 119 from U.S. Provisional Patent Application No. 60/291,903 titled "Modular Shelving With Cabinet" filed May 18, 2001, and U.S. Provisional Application No. 60/261,276 titled "Modular Shelving With Cabinet" filed on January 12, 2001, the full disclosures of which are hereby incorporated by reference,

BACKGROUND OF THE INVENTION

[0002] Field Of The Invention. The present invention relates generally to the field of modular shelving, and in its preferred embodiment to plastic injection and blow molding shelving which includes at least one cabinet having at least one door with an interference fit coupling system.

[0003] Description Of The Related Art. Many different types of shelving systems are known in the art, including modular metal and plastic systems which can be shipped and sold in compact packaging and erected by the consumer. For example, metal shelving units are sold that include a plurality of metal shelves and four metal corner pieces. The corners of the metal shelves are attached to the corner pieces by a bolt and nut assembly. This type of assembly requires a large number of individual pieces and specialized tools for assembly.

[0004] Other modular shelving and cabinetry is sold for organizing mail, tools, entertainment pieces, and other similar articles. This type of modular shelving and cabinetry is typically constructed from wood and/or metal in specific dimensions, Separate pieces of the modular shelving and/or cabinetry are designed to be mounted together by hardware which require screws, latches and/or bolts. Again, this type of modular shelving requires a large number of pieces. Additionally, this type of modular shelving and cabinetry is often expensive due to materials used for construction and purpose.

[0005] It is also known that such modular shelving can include one or more cabinets. Some systems include numerous drawers within the cabinet units. Others simply place a cabinet on a shelf, while yet others build the cabinet into the unit. For the latter, prior systems have required numerous component parts, resulting in higher manufacturing costs and more difficult assembly. Another disadvantage of many modular shelving and cabinetry is the lack of stability and balance. This problem is exacerbated when items are placed on or within the shelves and/or cabinetry off-center.

[0006] Accordingly, it is an objective of the modular shelving with cabinet of the present invention to provide shelving that is strong and balanced when properly erected. Another objective of the modular shelving with cabinet of the present invention is that it should be easy to assemble by having as few different parts as possible. A related objective of the modular shelving with cabinet is that it should not require specialized tools for assembly.

[0007] Yet another objective of the modular shelving with cabinet of the present invention is that it should be inexpensive to manufacture. The modular shelving with cabinet of the present invention should also eliminate the need for various components relating to the left or right side of the shelving unit. Finally, an objective of the modular shelving with cabinet is to achieve all of the aforesaid advantages and objectives without incurring any substantial relative disadvantage.

[0008] Modular shelving with cabinet that demonstrates the objectives and advantages as discussed above would represent a significant advance in this art.

SUMMARY OF THE INVENTION

[0009] The present invention overcomes the above noted disadvantages of the related art by providing a modular shelving with cabinet(s) that reduces manufacturing cost, reduces part count, and improves performance and ease of assembly. The present invention also eliminates the need for different components for the left and right side of the cabinet.

[0010] A further feature of the present invention is to provide modular shelving with cabinet(s) that requires less precise manufacturing tolerances than prior systems. This is accomplished by a coupling system used by the modular shelving with cabinet of the present invention.

[0011] A different feature of the present invention is to provide modular shelving with cabinet(s) in which each door is coupled to a vertical, tubular riser by an interference fit which inhibits unwanted door movement following assembly.

[0012] How these and other features of the invention are accomplished, individually, in combination or in various subcombinations will be described in the following detailed description of the preferred embodiment, taken in conjunction with the attached FIGURES. Generally, however, they are accomplished in a modular cabinet system including at least one shelf having sockets at its corners and vertically positioned risers coupled to the sockets to space the shelves apart. In the preferred embodiment, the risers are tapered and nest within one another to permit stacking multiple cabinets when erecting the modular shelving with cabinet. Each cabinet in the system preferably includes two side wall panels, a rear wall panel and at least one door panel, each being coupled to the risers by having the risers pass through hollow sections of the panels and through upper and lower holes therein. The holes have a diameter equal to or just slightly less than the smallest diameter of that portion of a riser located between two shelves, and one or more radial slots is provided in the material surrounding the holes to allow the material to flex and accommodate larger diameter portions of the riser to provide an inter-

ference fit.

[0013] The coupling system used to couple the panels with the risers is made by providing shelving material and providing a hole that extends through a portion of the shelving material. As mentioned above, the hole has at least one slot extending radially outward from the hole. The hole may be provided by methods known in the art including cutting the shelves material, or by blow molding the shelving material to include a raised portion on the surface of the shelving material, which may be subsequently removed, by cutting or the like, to expose the hole.

[0014] Other ways in which the features of the invention are accomplished will become apparent to those skilled in the art after they have read the specification, and such other ways are deemed to fall within the scope of the present invention if they fall within the scope of the claims which follow.

DESCRIPTION OF THE DRAWINGS

[0015] FIGURE 1 is a perspective view of a portion of a modular shelving with cabinet including a cabinet having two door panels;

[0016] FIGURE 2 is a partial perspective view of a portion of one of the door panels illustrated in FIGURE 1 showing a coupling system in accordance with the teachings of the present invention;

[0017] FIGURE 3 is a schematic illustration of a portion of a riser and a portion of the door panel illustrated in FIGURES 1 and 2;

[0018] FIGURE 4 is a perspective view of modular shelving with cabinet in accordance with the teachings of the present invention;

[0019] FIGURE 5 is an exploded view of the modular shelving with cabinet illustrated in FIGURE 4;

[0020] FIGURE 6 is a perspective view of an alternate embodiment of modular shelving with cabinet in accordance with the teachings of the present invention; and

[0021] FIGURE 7 is an alternate perspective view of the modular shelving with cabinet illustrated in FIGURE 6 showing doors panels in an open position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0022] Before beginning the detailed description of the preferred embodiment, several general comments can be made about the applicability and the scope of the present invention.

[0023] First, while a modular shelving with cabinet is shown which includes tubular risers, the risers need not be tubular to take advantage of the present invention. For example, the risers may have a rectangular, polygonal, triangular or circular cross-section, and the cross-section may be substantially uniform or may alternate between geometric designs as known in the art.

[0024] Second, a modular shelving with cabinet is shown with at least two doors. However, the modular shelving with cabinet of the present invention may have only one door to take advantage of the present invention,

[0025] Third, blow molded panels are preferred for use in the modular shelving with cabinet, including side, back and door panels. However, other molding techniques can be used as long as they provide a thickness suitable for receiving a riser therethrough.

[0026] Fourth, while polyethylene is the preferred material for the blow molded panels, other plastics and deformable materials may be employed.

[0027] Fifth, risers employed in the present invention may have a taper of approximately $1/16^{th}$ of an inch to $1/4^{th}$ of an inch between adjacent shelf sockets. However, the amount of taper, or whether a taper exists at all, can be varied by one skilled in the art after they appreciate the present invention.

[0028] Sixth, while the preferred and illustrated embodiment shows a coupling system with a hole having four slots extending radially therefrom, the number of slots can be as few as two and can be a greater number, e.g., eight or more. Furthermore, the length of the slot can widely vary, being determined primarily by product geometry. Preferably, the slot should be about $1/8^{th}$ of an inch or greater, and in the preferred embodiment is closer to 1/2 of an inch for each slot.

[0029] Lastly, the illustrations show that side panels of the modular shelving with cabinet do not extend over the edges of the shelves but extend between them. On the other hand, the door panels are constructed and arranged to have flanges at their upper and lower surfaces which cover the front edges of the shelves. The modular shelving with cabinet may be altered by having the side panels also constructed to conceal the shelving edges and/or the door panels may be constructed to fit within the space defined by the shelves.

[0030] Proceeding now to a description of FIGURE 1, a modular shelving with cabinet 10 is shown, and includes a first shelf 12, a second shelf 14 and an upper shelf 16. More shelves can be employed and additional cabinet systems can be stacked upon one another as will be later shown and described. Risers 17 are located at each corner of the shelves 12, 14, and 16 and serve to space the shelves apart from one another and to support loads placed thereon. The risers 17 also serve to raise the shelves 12, 14, and 16 off the ground. In the preferred embodiment, the risers 17 are arranged so that they taper from the top to the bottom so that they are capable of being nested with respect to adjacent risers, For example, the riser designated by reference numeral 17 in FIGURE 1 can have its lower end nest in the upper end of a riser situated below it, while the upper end may receive the lower end of a different riser.

[0031] The risers 17 extend through each shelf 12, 14, and 16 at sockets 19. Sockets 19 are located at the corner of each shelf and serve to receive the upper and lower ends of the risers 17. The socket geometry can

be any known to this art, including without limitation substantially circular, rectangular, polygonal, or triangular geometry. However, in the preferred embodiment, the sockets 19 are substantially circular. In other embodiments, the sockets 19 may also be formed to permit the risers 17 to be plugged into the sockets 19 to support the shelves 12, 14, and 16.

[0032] The cabinet components of the present invention include side panels 22 (only the left one of which is shown), a rear panel (which is not visible in this view) and a pair of door panels 24 and 25. In the preferred embodiment, each of these panels are blow molded and are therefore at least partially hollow with a thickness at the panel edges adjacent to the risers greater than the riser thickness, The panels each fit over the risers 17 to assemble the shelving unit 10 and form the cabinet between shelves 14 and 16.

[0033] In the illustrations, side panels 22 have extensions 23 at their front and rear edges, the extensions 23 being approximately one-half the height of the panel. The extensions 23 fit over risers 17 and rest upon shelf 14. The panels are held in place, in part, by a coupling system to be described in greater detail in connection with FIGURES 2 and 3. The door panels 24 and 25 also include extensions 27 at one of its side edges, which are capable of extending over the risers 17, The door extensions 27 are located at the top of the space between two adjoining shelves 12 and 14. Accordingly, extensions 27 will rest upon extensions 23 as is illustrated in FIGURE 1. Similar extensions 27 extend from the rear panel (which is otherwise not shown) for coupling the rear panel to the risers 17 and to the overall shelving assembly 10. Although the extension location is described herein, it will be apparent that other embodiments of the present invention may have side panels with extensions located at the upper half of the panel and door and rear panels with extensions at the lower half of the panels.

[0034] The side 22 and rear panels are coupled to two different risers 17 at extensions 23 and 27, respectively, so that the side 22 and rear panels are fixed into position and may not pivot about the axis of any one riser. Conversely, doors 24 and 25 are coupled to only one riser by extension 27, and each may pivot about the axis of a riser 17 so that it may be opened and closed. Each of the doors may also include a knob or pull 31 that may be selected by any cabinet hardware known in the art or may be integrally molded within the doors.

[0035] The coupling system of the present invention can best be appreciated by reference now to FIGURE 2, which shows the extension 27 and a portion of door 24. The top of extension 27 is a planar surface 34, and a hole 35 is provided therein, The hole 35 passes through the extension 27 to the bottom surface of the extension 27 (which is not visible in this view). Extending radially from hole 35 are one or more slots 37, four of which are illustrated in the preferred embodiment. From this FIGURE, it will be evident that the area between the slots 37 will have the ability to flex upwardly or downwardly with respect to the surface 34, and provide an interference fit when used in combination with a riser 17. The hole 35 may be formed by methods known in the art, including providing a raised surface during the blow-mold process, which is subsequently removed by cutting or the like to expose the hole 35 that extends through extension 27. Another method of forming the hole 35 would be to cut the hole 35 within the top surface 34 and bottom surface of extension 27.

[0036] The size of the hole 35 is selected for particular applications, but in the most preferred embodiment, it is just slightly smaller than the smallest portion of the riser that will be encountered during assembly of the component. This will provide an amount of interference at the lower end of the extension and a slightly greater amount of interference at an upper portion of the same riser, due to the taper of the riser and the fact that the holes 35 are of the same size. Preferably, the hole 35 is no larger than the smallest diameter or cross-sectional area of the riser 17 to be encountered to prevent misalignment or sagging of the various components. The invention also contemplates holes other than round holes. For example, if square risers are used, the holes would be square and the slots could extend from the corners or the sides of the holes, or both.

[0037] FIGURE 3 illustrates a riser 17 extending upwardly through the hole 35 of extension 27. The portions of the top surface 34 between slots 37 flexes to fit around riser 17, while simultaneously applying pressure against riser 17 to hold the panel in place. The bottom surface of extension 27 is not visible in this FIGURE; but would also provide an interference fit around riser 17 through use of a hole with one or more slots.

[0038] Referring to FIGURES 4-7, a cabinet 40 according to an exemplary embodiment includes a plurality of shelves 42 supported by a plurality of risers 44, a bottom 46 (which may also function as a shelf), and a top 48 (which may also serve as a shelf). Risers 44 engage sockets 50 at corners of shelves 42, bottom 46, and top 48. According to a preferred embodiment, four risers 44 are used for each cabinet component 70 and are tubular.

[0039] Cabinet 40 also includes a plurality of side panels 52, a plurality of rear panels 54, and a plurality of door panels 56. Side panels 52 and rear panels 54 include a pair of extensions 58, 60 respectively. Each door panel 56 also includes a extension 62. Extensions 58, 60, 62 are configured to receive risers 44 to couple each panel (side, rear, and door) to al least one riser 44.

[0040] According to an exemplary embodiment, extensions 58, 60, 62 are configured and positioned on the panels to provide modularity and interchangeability. For example, as shown in FIGURES 4-7, extensions 58 on side panels 52 are disposed on a lower portion of the panel; extensions 60 on rear panels 54 are disposed on an upper portion of the panel; and extension 62 on door panel 56 are disposed on an upper portion of the panel.

Alternatively, the extensions may be disposed on the other of the upper and lower portion. Alternatively, the extensions may alternate between the upper and lower portion on a single panel.

[0041] According to an exemplary embodiment shown in FIGURES 4 and 5, door panels 56 cover (at least partially) one shelving space 61. According to an alternative embodiment shown in FIGURES 6 and 7, door panel 56 is configured to cover a pair of shelving spaces 61, in which case the door panel 56 may include a pair of extensions 62 that engage risers 44. Alternatively, the door panels may cover any number of shelving spaces (e.g., three shelves, all of the shelves, the entire front of the cabinet, etc.).

[0042] While the present invention has been described in connection with a single preferred embodiment, the invention can be variously embodied as indicated above and in other ways which become apparent to those skilled in the art after they have read this specification.

[0043] Accordingly, the scope of the invention is not to be limited by reference to any particular materials, descriptions or illustrations, but is to be limited solely by the scope of the claims which will be provided for this application.

Claims

1. A coupling system for shelving comprising:

   a first vertical panel including a first extension located at least partially along a first vertical edge, the first extension defining a hole having at least one slot extending radially therefrom; and
   at least one riser configured to engage the hole;

   wherein the slot is configured to allow a portion of the extension to flex when the riser engages the hole to provide an interference fit.

2. The coupling system of claim 1, wherein the hole has a cross-sectional area no more than the smallest cross-sectional area of the riser.

3. The coupling System of claim 1, wherein the panel is made from blow molded plastic.

4. The coupling system of claim 1, wherein at least a portion of the panel has a thickness greater than the thickness of the riser.

5. The coupling system of claim 1, wherein the riser is tubular.

6. The coupling system of claim 1, wherein two slots extend radially from the hole.

7. The coupling system of claim 1, wherein four slots extend radially from the hole.

8. The coupling system of claim 1, wherein the panel includes a second extension located at least partially along a second vertical edge opposite the first edge, the second extension defining a second hole having at least one slot extending radially therefrom.

9. The coupling system of claim 1, further comprising a second panel having a third extension defining a hole having at least one slot extending radially therefrom, wherein the first extension and the third extension are configured to engage the riser.

10. The coupling system of claim 1, wherein the panel is configured to rotate about the axis of the first extension to provide access to the interior of the shelving.

11. A modular cabinet system comprising:

    at least one shelf;
    a plurality of risers; and
    at least one side wall defining a first hole passing therethrough, the first hole having at least one slot extending radially therefrom and a diameter less than each riser;

    wherein a first riser coupled with the shelf extends through the first hole of the side wall.

12. The modular cabinet of claim 11, wherein the side wall defines a second hole passing therethrough, the second hole having at least one slot extending radially therefrom and a diameter less than each riser

13. The modular cabinet of claim 12, wherein a second riser coupled with the shelf extends through the second hole so that a portion of the side wall is intermediate the first riser and the second riser.

14. The modular cabinet of claim 11, wherein the side wall includes a first extension along a first vertical edge, the first extension defining the first hole.

15. The modular cabinet of claim 14, wherein the first panel may pivot about the axis of the first riser at the first extension,

16. The modular cabinet of claim 11, wherein at least a portion of each riser is tapered.

17. The modular cabinet of claim 11, wherein the shelf has four corners, each corner surrounding a socket for coupling with each riser.

18. The modular cabinet of claim 11, wherein the risers have a cross-sectional geometry selected from the group consisting of circular, rectangular, polygonal, and triangular.

19. The modular cabinet of claim 18, wherein the first hole and the second hole have a cross-sectional geometry substantially the same as the risers.

20. A method of making a coupling for shelving panels, the method comprising:

providing a vertical panel having at least one extension along at least a portion of a first vertical edge; and
providing a hole that extends through two opposing sides of the first extension, wherein the hole has at least one slot that extends radially outward from the hole at each opposing side of the first extension and the slot is configured to allow a portion of the first extension to flex.

21. The method of claim 20, wherein the hole is provided by cutting the vertical panel.

22. The method of claim 20, wherein the-hole is provided by blow molding the vertical panel to include a raised portion configured in substantially the same shape as the hole, and removing the raised portion to expose the hole.

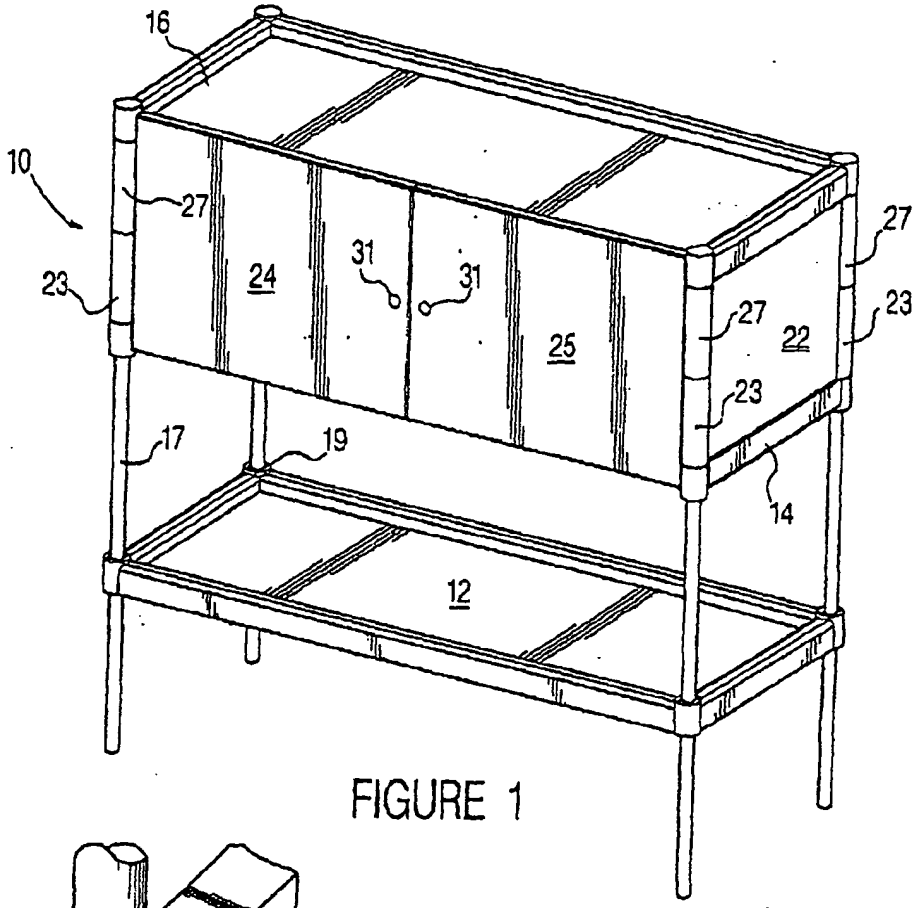

FIGURE 1

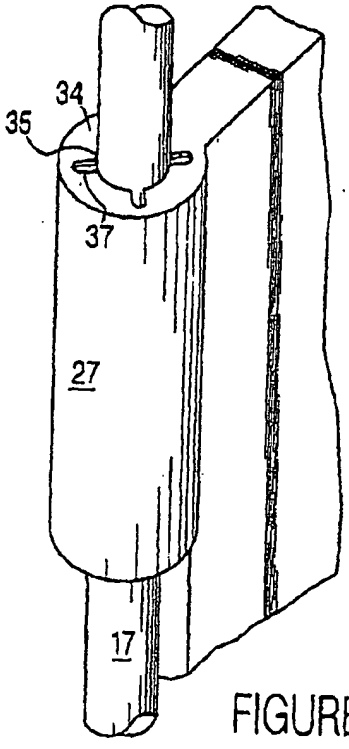

FIGURE 3

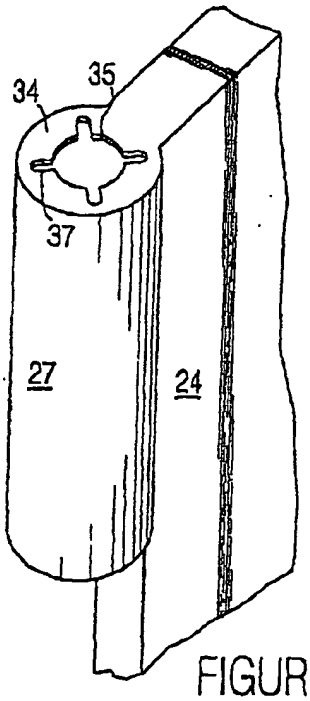

FIGURE 2

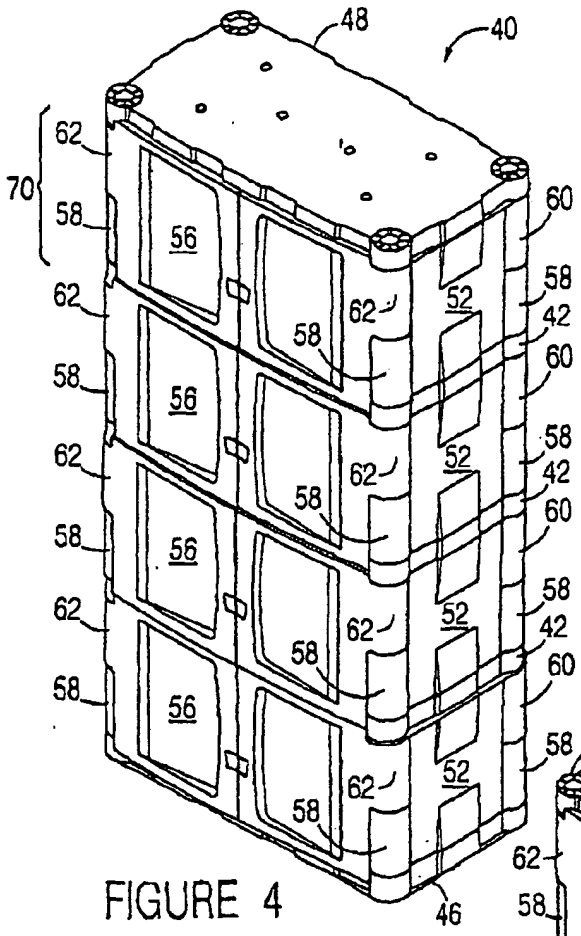

FIGURE 4

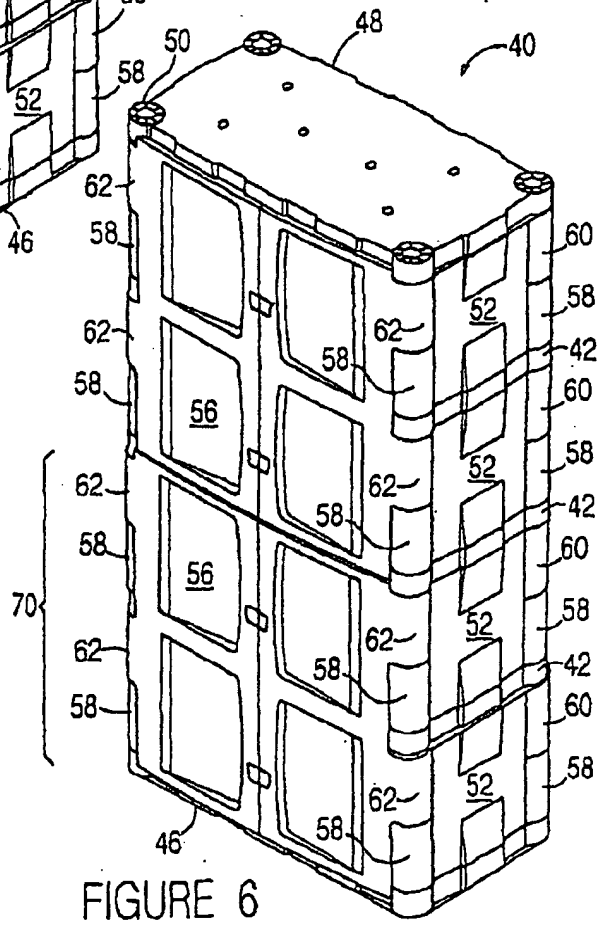

FIGURE 6

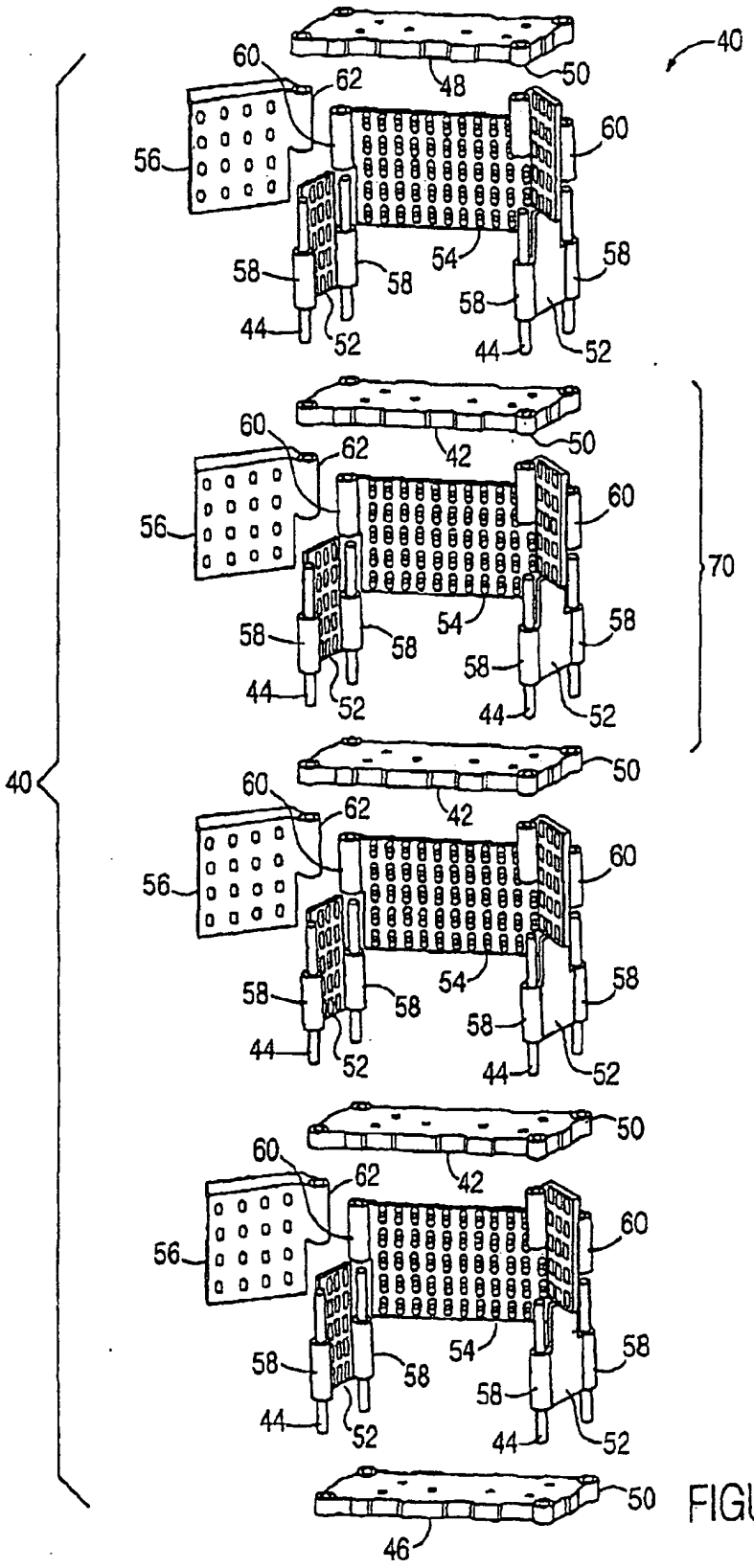
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FIGURE 5

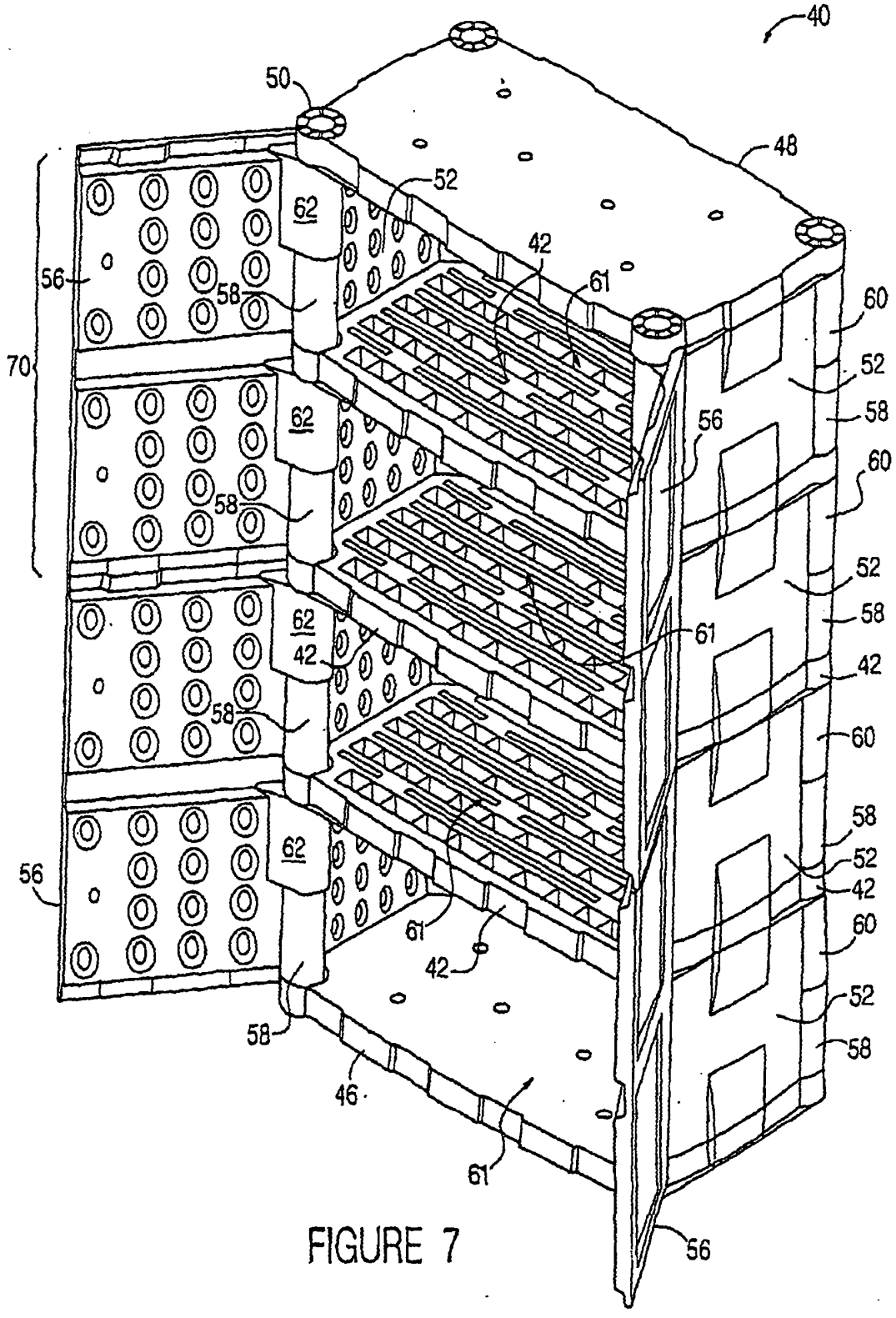

FIGURE 7